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PSP Cover Sheet

Proposal Title: Distribution Patterns of Mercury and Methylmercury in Tidal Wetland Ecosystems of North San Francisco Bay

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Amount of funding requested: $ 1,060,500

Some entities charge different costs dependent on the source of the funds. If it is different for state or federal funds list below.

State cost _____ Federal cost _____

Cost share partners? ___ Yes ✓ No

Identify partners and amount contributed by each _____

Indicate the Topic for which **you** are **applying** (check only one **box).**

- ☐ Natural Flow Regimes
- ☐ Nonnative Invasive Species
- ☐ Channel Dynamics/Sediment Transport
- ☐ Flood Management
- ☐ Shallow Water Tidal/ Marsh Habitat
- ☒ Contaminants
- ☐ Beyond the Riparian Corridor
- ☐ Local Watershed Stewardship
- ☐ Environmental Education
- ☐ Special Status Species Surveys and Studies
- ☐ Fishery Monitoring, Assessment and Research
- ☐ Fish Screens

What county or counties is the project located in? Marin, Sonoma, Napa, Solano and Contra Costa

What CALFED ecozone is the project located in? See attached list and indicate number. Be as specific as possible 2

Indicate the type of applicant (check only one box):

- ☐ State agency
- ☐ Public/Non-profit joint venture
- ☐ Local government/district
- ☐ University
- ☐ Other: _____
- ☐ Federal agency
- ☒ Non-profit
- ☐ Tribes
- ☐ Private party

Indicate the primary species which the proposal addresses (check all that apply):

- ☐ San Joaquin and East-side Delta tributaries fall-run chinook salmon
- ☐ Winter-run chinook salmon
- ☐ Spring-run chinook salmon
- ☐ Late-fall run chinook salmon
- ☐ Fall-run chinook salmon
- ☐ Delta smelt
- ☐ Longfin smelt
- ☐ Splittail
- ☐ Steelhead trout
- ☐ Green sturgeon
- ☑ Striped bass
- ☐ White Sturgeon
- 3 All chinook species
- ☒ Waterfowl and Shorebirds
- ☐ All anadromous salmonids
- ☐ Migratory birds
- ☐ American shad
- ☐ Other listed T/E species: _____

Indicate the type of project (check only one box):

- ☒ Research/Monitoring
- ☐ Watershed Planning
- ☐ Pilot/Demo Project
- ☐ Education
- ☐ Full-scale Implementation

Is this a next-phase of an ongoing project? Yes ___ No ✓

Have you received funding from CALFED before? Yes ✓ No ___

If yes, list project title and CALFED number CMARP, B-81635

Have you received funding from CVPIA before? Yes ___ No ✓

If yes, list CVPIA program providing funding, project title and CVPIA number (if applicable):

By signing below, the applicant declares **the** following:

- The truthfulness of all representations in their proposal;
- The individual signing the form is entitled to submit the application on behalf of the applicant (if the applicant is an entity or organization); and
- The person submitting the application has read and understood the conflict of interest and confidentiality discussion in the PSP (Section 2.4) and waives any and all rights to privacy and confidentiality of the proposal on behalf of the applicant, to the extent as provided in the Section.

Donald Yee
Printed name of applicant

Donald Yee
Signature of applicant

MARGARET R. JOHNSTON
Executive Director

Margaret Johnston

EXECUTIVE **SUMMARY**

Distribution Patterns **of** Mercury and Methylmercury in Tidal Wetland Ecosystems **of** North San Francisco Bay

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Efforts to restore wetland ecosystems are being proposed in various locales, among them areas in North San Francisco Bay and the Lower Delta. Although wetland restoration is generally considered a positive development, in some cases anthropogenic contamination may already be so extensive that attempts to restore particular wetlands may negatively impact wildlife and human health unless steps are taken to minimize such risks. One particular concern is the impact of restoration on population dynamics of the endangered California clapper rail, which has been observed to accumulate potentially harmful concentrations of contaminants in San Francisco Bay tidal marshes. Locally, little effort has been devoted to investigating such possible impacts, which this proposal aims to address for one contaminant of concern, mercury.

One reason for special concern with mercury is its potential for biological transformations in the environment which render it more harmful than the initial forms released naturally or anthropogenically. Specifically, methylmercury, which is primarily formed by bacteria in anaerobic environments such as found in wetland sediments, is both more toxic and has a greater potential for bioaccumulation than the elemental and ionic forms of mercury generally produced or released by human activity.

There is a substantial and growing body of work on mercury geochemistry and bioaccumulation, but much of the work has focused on freshwater habitats. **A** number of environmental parameters such as total mercury, salinity, sulfate, temperature, pH, and dissolved or total organic carbon have been demonstrated to influence methylmercury production. These may interact in antagonistic or synergistic manners and can vary in an estuarine sytem spatially and on seasonal and daily cyles. Recent studies suggest that spatial variations, particularly in sulfate and sulfide, are associated with variation in net methylmercury production (Benoit et al. 1998; Gilmour et al. 1998).

This project will examine variations of environmental parameters and their effects on mercury and methylmercury distribution in the sediments, water and biota of three tidal marshes along a gradient of salinity in the North San Francisco Bay. Sampling will be conducted in three seasons over three years to better understand influences of seasonal and interannual variation in flows and contaminant loads on mercury geochemistry and bioaccumulation. We expect that some of the relationships found previously in the literature for other marine and freshwater ecosystems will be confirmed for the local environment.

This knowledge can be applied by CALFED in deciding whether and how to proceed with wetland restorations at selected sites. For restoration projects that proceed, similar studies can then be conducted to further refine understanding of mercury transformation and bioaccumulation processes in an adaptive process.

PROJECT DESCRIPTION

PROBLEM STATEMENT

Efforts to restore tidal wetland ecosystems are being proposed for areas in San Pablo and Suisun Bay, and the Lower Delta. Although restoration of wetlands to a more natural state is generally viewed a positive development, in some instances anthropogenic contamination may already be so pervasive and severe that attempts to restore particular wetlands may negatively impact wildlife and human health unless specific precautions are taken to minimize such risks. Of particular concern is the potential impact of restoration on population dynamics of the endangered California clapper rail, which has been observed to accumulate potentially deleterious concentrations of mercury in San Francisco Bay tidal marshes. Relatively little effort to date has been devoted to investigating these possible impacts, a shortcoming which this proposal aims to address for mercury. This study aims to improve our understanding of the following:

- Spatial and temporal variation of mercury and methylmercury in North Bay tidal wetlands.
- Primary environmental factors influencing the net methylation of mercury in these areas.
- Mercury accumulation and possible impacts in California clapper rails and other species at different trophic levels in these environments.

One reason for particular concern with mercury is its potential for biological transformation in the environment, which renders it more harmful than the initial forms released naturally or anthropogenically. Methylmercury, which is primarily formed by bacteria in anaerobic environments such as is found in wetland sediments, is both more toxic and has a greater potential for bioaccumulation than the elemental and ionic forms of mercury generally produced or released by human activity. Previous studies have found correlations between methylmercury and the percentage of wetland coverage in a watershed (Hurley et al. 1995; Rudd 1995.; St. Louis et al. 1996). It has been shown that mercury present in soils and vegetation is released into the aquatic environment after flooding and transformed into methylmercury, with resulting increases in fish tissue concentrations (Bodaly et al. 1984; Hecky et al. 1987; Kelly et al. 1997; Paterson et al. 1998). Methylmercury production is particularly intense in flooded wetlands, due to the large quantities of organic carbon for bacteria to consume to generate anaerobic conditions (Kelly et al 1997).

Although there is a substantial and growing body of work on mercury geochemistry and bioaccumulation, much remains to be elucidated. A number of environmental parameters such as total mercury(Watras et al. 1995; Benoit et al. 1998), salinity(Mason et al. 1996; Barkay et al. 1997), sulfate(Oremland et al. 1995; Chen et al. 1997; Benoit et al. 1998; Gilmour et al. 1998), temperature(Choi et al. 1994), pH(Xun et al. 1987; Westcott and Kalff 1996; Rose et al. 1999), and dissolved or total organic carbon (Driscoll et al. 1995; Krabbenhoft et al. 1995; Westcott and Kalff 1996; Barkay et al. 1997)have been demonstrated to influence mercury bioaccumulation and methylmercury production or degradation. These may interact in antagonistic or synergistic manners and can vary in estuarine sytems spatially and on seasonal and daily time scales.

This project will examine variations in environmental parameters and their effects on mercury and methylmercury distribution in the sediments, water and selected biota of

tidal marshes along a gradient of salinity in North San Francisco Bay. Sampling will be conducted in three seasons for a period of three years to evaluate the influences of seasonal and interannual variation in flows, contaminant loads, and other physical and chemical characteristics on mercury geochemistry and bioaccumulation. We expect that many of the relationships found previously in the literature for other marine and freshwater ecosystems will be similar for the local environment. However, finding differences will be just as instructive; by evaluating these similarities and differences, we can refine our conceptual understanding of mercury for the local estuarine environment.

This knowledge can be applied by CALFED in deciding whether and how to proceed with tidal wetland restoration projects at selected sites. For example, if net methylmercury is found to be elevated within a particular range of sulfate concentrations, restoration projects might be better pursued in more riverine or saline regions, nearer the Delta or Central Bay, respectively. Similarly, if wet-season flows deposit sediments with higher mercury than in the dry season, decisions on the timing of levee breaches could be affected. Potential mercury methylation is only one of many factors that should be considered; timing and location of wetland restorations should also be guided by the life cycles and other requirements of particularly desired biota (e.g. species endangered or with commercial and recreational value). For restorations that proceed, additional studies can then be conducted to further refine our understanding of mercury transformation and bioaccumulation in an iterative and adaptive process.

CONCEPTUAL MODEL AND HYPOTHESES BEING TESTED

Tidal wetlands share a common physiographic template and set of geomorphic features and processes. Methylmercury production is likely to be elevated in a few areas within the template. We hypothesize that spatial and temporal patterns exist in methylmercury production within tidal marshes. Preliminary data from USFWS studies support the hypothesis that channel order has a significant influence on methylmercury production. Understanding these patterns will allow evaluation of the most highly impacted species, comparisons among local tidal wetlands using a stratified sampling approach, and regional comparisons among wetlands. The ability to make local and regional comparisons will allow CalFED to select locations and methods for wetland restoration that minimize potential mercury accumulation hazards.

Our current conceptual understanding of environmental mercury processes and the information needed to test the validity of this model are presented below for the highly inter-related issues of environmental mercury distribution, mercury transformations, and bioaccumulation.

Mercury Distribution

Knowledge of mercury and methylmercury distribution in tidal wetlands is crucial in determining possible risk to the ecosystem. Studies have found significant correlations between total mercury and methylmercury concentrations in sediments (Benoit et al. 1998) and water (Watras et al. 1995). To make appropriate management decisions on local wetland restoration, managers need to know if significant differences exist in total mercury of North Bay tidal wetlands.

Both mercury and methylmercury are found naturally, so wetland restoration cannot provide habitat less contaminated with mercury than "baseline" conditions (prior to human influence). Baseline concentrations may not be achievable through purely local

actions, as global anthropogenic contributions to atmospheric mercury have impacted environments distant from industrial activity (Lockhart et al. 1995). .

In addition to atmospheric mercury, marshes may have captured large loads of mercury-laden fine sediments from Gold Rush mining (ca. 1850-1880) and more recent deposits (ca. 1950) from mechanized mercury mining or other industrial activities (Homberger et al. 1999). Areas currently receiving mercury-laden sediments or near highly contaminated historical deposits in shallow sediments may pose larger risks to ecosystem health than other sites.

Current dats on sediment mercury from USGS and other researchers are useful but are too sparse to use in evaluating risk in existing marshes and proposed wetland restorations. For example, channel migration and headward erosion within tidal marshes might expose deposited mercury to methylation: This study will evaluate if the variation in mercury distribution within and among marshes is significant, information needed to assess the risk posed by mercury and to determine if alternative management actions are possible and effective.

Mercury transformations

Because of the importance of biological transformations in the distribution and fate of mercury in the environment, total mercury is only one of many factors that must be examined. A variety of environmental conditions can affect the speciation of inorganic mercury and thus the possibility of microbial methylation. Effects of some environmental parameters on mercury methylation have been documented in the literature but have shown different results over different ranges of these parameters. We intend to examine mercury and methylmercury for sites in Bay-Delta tidal wetlands for the following set of ancillary parameters to evaluate their influences on methylmercury production: salinity, pH, sulfate, sulfide, dissolved and total organic carbon (DOC & TOC), channel order, and temperature.

A number of chemical parameters generally co-vary in estuarine waters. Some of these factors will affect inorganic mercury bioavailabilty and methylmercury production anddegradation additively or synergistically, whereas others will act antagonistically. For example, salinity, sulfate, and pH generally all increase with increasing marine influence in an estuary and can influence mercury availability. Mercury geochemistry is complex given interactions between these factors, and field studies are needed to further our understanding of mercury in the local environment.

Examination of USFWS data on methylmercury concentrations in sediments of North Bay tidal marshes suggests differences with channel order that conform to some of our expectations of methylmercury geochemistry (Swarzbach et al. 2000). Because of smaller tidal excursions and lower flow rates in low-order channels, methylmercury production is likely to increase and occur nearer the surface, where biota may be exposed. The increased organic load found in low-order channels increases anaerobic bacterial activity and thus mercury methylation. Lower flow regimes in low-order channels may also disturb the sediment surface less, allowing the oxic/anoxic interface to develop nearer the surface. This may impact biota at the sediment surface, as they will reside nearer or even in the zones of maximum methylmercury production and accumulation.

Another consequence of lower channel order may be increased temperature, as less cold and aerated water finds its way up the farther reaches of a marsh on the tidal cycle. Higher temperatures may increase net methylation rates (Bodaly et al. 1993; Choi et al.

1994), even if demethylation increases(Matilainen and Verta 1995). Temperature would also influence temporal variations in mercury methylation and demethylation.

With increasing marine influence in an estuary, salinity, pH, and sulfate all generally increase. Salinity and sulfate influence mercury methylation non-linearly over the range of estuarine concentrations. At low and high chloride, bacterial mercury uptake and methylation is reduced relative to rates at intermediate salinity (Barkay et al. 1997), and this effect is also seen on phytoplankton mercury uptake (Mason et al. 1996). Similarly, bacterial methylation rises with sulfate increases to intermediate levels (Chen et al. 1997), but this effect reverses as sulfate increases further. The ratio of methyl- to total mercury is relatively low in estuaries (Benoit et al. 1998), possibly due to higher marine sulfide concentrations. Another mechanism contributing to low estuarine methylmercury is an increase in oxidative demethylation by sulfate-reducing bacteria with addition of sulfate (Oremland et al. 1995).

In freshwater systems, pH affects mercury methlyation and bioaccumulation. Mercury methylation rates increased with decreasing pH in the epilimnion and surface sediment of lakes (Xun et al. 1987). Others have found increased methylmercury concentrations correlated well with decreased pH in lakes for fish and zooplankton, respectively (Westcott and Kalff 1996; Rose et al. 1999). Increased pH might therefore be expected to decrease mercury methylation and accumulation.

Principal component analysis and multiple regression will be used to determine the primary influences from among these many environmental characteristics. For sulfate and chloride, transformations from raw concentrations to proxies more closely approximating known chemical and biological processes (uncharged chloride species, relative methylation to demethylation rates at various sulfate levels) may be necessary for proper evaluation of their influence.

Mercury bioaccumulation

Mercury bioaccumulation will be evaluated to determine whether patterns seen in methylmercury production in sediment and water translate into patterns in food web contamination. Trophic position is one of the primary factors influencing tissue mercury (primarily methylmercury) concentrations, with concentrations increasing with each step in the food web. Multiple trophic levels will be sampled to assess whether spatial and temporal patterns propagate through the food web. Particular attention will be given to food web transfer of methylmercury to clapper rails.

Past work by USFWS has found mercury concentrations in fail-to-hatch clapper rail eggs that exceed accepted thresholds for toxic effects. Developing embryos are the most sensitive lifestage for mercury toxicity. Observed mercury concentrations may be contributing to the low productivity observed for San Francisco Bay clapper rails. Because of the fidelity of individual rails to a particular marsh and even specific territories within that marsh for feeding, they may reflect the spatial variability in mercury concentrations found within and between marshes.

Benthic invertebrates generally do not travel between marshes, and they seldom move great distances within a marsh. Therefore, we expect they will reflect spatial differences in mercury among marshes and possibly among channels within marshes. The short life spans of some species may also result in observable seasonal differences in tissue mercury concentrations.

Tidal wetland fish species are generally more mobile than invertebrates. Fish that feed in the water column such as silversides and juvenile striped bass move easily among channels and therefore likely only reflect differences among marshes. Fish such as gobies and sculpin that are temtorial and feed at the sediment move less and thus may reflect the spatial variations within a marsh. Knowledge of mercury in Bay fish other than the sport and commercial species studied is needed to evaluate impacts to the ecosystem, such as on pescivorous birds.

ADAPTIVE MANAGEMENT

This proposal includes necessary targeted research to address questions on the risks of restoring mercury-contaminated wetlands in North San Francisco Bay. Correlations of environmental parameters to mercury in biota are found in the literature, but some of these have conflicted (e.g. effects of temperature on demethylation, of DOC on methylation). Although some literature indicate estuarine environments produce less methylmercury, mercury concentrations exceeding accepted thresholds for toxic effects are found in fail-to-hatch clapper rail eggs. Mercury processes should be studied locally to better understand their importance in wetlands of North San Francisco Bay.

Information on the primary influences on methylmercury production and accumulation in regional food webs will be needed in decision-making processes for wetland restorations. By providing data to redefine and refine our conceptual model of existing local wetlands, better predictions for the outcomes of restorations can be made and negative impacts thus avoided. Strong correlations or a lack thereof between mercury and methylmercury in wetlands and their biota can illuminate differences in risks of impacts from among alternatives of site locations and filling materials or methods. Better understanding of mercury transformations and trophic transfers within the local food web will allow better evaluation of the results of restorations, which can then be used in choosing the next iteration of management actions.

A sampling project covering the full range of spatial and temporal variability becomes quire resource intensive. The project as currently described sacrifices some spatial coverage (e.g. sampling only one set of channels per marsh) to cover other factors that are expected to be more significant. Should this prove not to be so, in later years sampling would be adjusted by trading off some of the seasonal samples or duplicate samples within channels for samples from other channels in the same marsh. Decisions on such adjustments would be made after each year of sampling. Similarly, if particular species cannot be found in some areas at times, for example because of near-freshwater conditions, the nearest equivalent species will be collected for tissue sampling. These decisions would be made in the field.

PROJECT LOCATION

This project will be conducted in six marshes along the main salinity gradient in the North Bay (China Camp in Marin County, Petaluma Marsh in Sonoma County, Coon Island in Napa County, Southampton Marsh and Rush Ranch in Solano County, and Browns Island in Contra Costa County). All marshes will be sampled for total mercury in deep sediments, China Camp, Rush Ranch, and Brown's island will be sampled for shallow sediments, water, and biota. Figure 1 shows the locations being sampled.

APPROACH

Mercury distribution

This study will test our hypotheses on mercury distribution within and among tidal wetlands by collecting data at six marshes along the main salinity gradient in the North Bay. Two sites will be studied each year during the three-year project.

To establish background conditions and the significance of anthropogenic contributions to mercury loading in tidal marshes, we will test a null hypothesis that mercury concentrations have not varied significantly over time. Primary cores 2 m deep will be taken in the six marshes away from any tidal channels. The depth of bioturbation on the vegetated marsh plain is usually less than 15 cm and largely can be accounted for by sampling different sediment size fractions. For each primary core, a chronology will be developed using profiles of ^{14}C, ^{210}Pb, and indicator pollen horizons. The primary cores will be x-rayed and variations in density will be quantified as changes in percent organic faction, as measured by loss on ignition. Total mercury concentration will be determined at 2-3 cm intervals throughout the upper 25-50 cm of each core, depending on the depth of the recent inorganic stratum. Mercury concentrations at greater depths will be measured less frequently. To assess spatial variability of long-term inorganic sedimentation, two secondary cores will be taken within each marsh and x-rayed. Corresponding stratigraphy among the primary and secondary cores within each marsh will be verified by ^{210}Pb and pollen profiles. We expect to find the null hypothesis false; rates of mercury loading correspond to rates of inorganic sedimentation, which increased significantly in much of the Bay and Delta during the late 1800s.

To examine the spatial variability within marshes, we will take a set of three tertiary cores 50 cm deep along transects extending away from two first-order channels and two third-order channels at each of the six study sites. Each of these cores will be x-rayed and vertical changes in inorganic content will be quantified. Chronologies of these cores will be based upon the corresponding primary core for each site. We expect the null hypothesis, that rates of inorganic sedimentation do not vary with distance away from tidal marsh channels, will be found false. Inorganic sedimentation will likely decrease away from channels and is lower along first-order channels than along third-order channels. Historically deposited mercury concentrations will also likely vary with distance away from tidal marsh channels. To test this hypothesis, we will measure total mercury concentration at the depth corresponding to the local peak inorganic sedimentation rate in tertiary cores for one first-order and one third-order channel at each study site. If particle size distributions are similar among marsh sediments for different channel orders as we expect, total mercury concentrations will be proportional to amounts of fine inorganic sediment and therefore decrease with distance away from channel banks and with distance along the banks from third-order to first-order channels.

Knowledge on sedimentation rates and mercury depth profiles can be used to evaluate the amounts of mercury that might become either more or less exposed to biota in the short and longer term from storm events, flow alterations, or other disturbances.

Mercury Transformations

The variability in environmental characteristics influencing mercury methylation will be captured by sampling three wetlands along the main salinity gradient of the North Bay (China Camp , Rush Ranch, and Browns Island) during the winter, spring, and summer to include high, intermediate, and low freshwater flows from the Delta. Each of the

marshes will also be sampled in first-, second-, and third-order channels to capture smaller spatial patterns of mercury biogeochemistry that we expect to find. This will likely lead to a wide range in salinity, pH, sulfate, sulfide, dissolved and total organic carbon (DOC & TOC), and temperature among collected samples. Although unpredictable flows during the spring may introduce unwanted variability in sampling, this is a crucial period in breeding and growth for many species and thus may be necessary to connect environmental mercury concentrations to biological effects.

For each marsh, one grab sample of surface water for each channel order will be collected from channel centers using clean techniques. A single duplicate water sample will be collected at each marsh, such that one duplicate for each channel order will be collected each sampling season. A separate (non-clean) grab sample will be collected and filtered at each site to determine suspended solids. Samples will be kept on ice in the field, and shipped frozen or chilled to the analysis lab. Samples will be analyzed for methylmercury, total mercury, sulfate, and DOC. Conductivity, pH, and optical density will be measured in the field.

Two surface sediment grabs will be taken in each channel, in the channel center and at the channel edge. Duplicate sediment grabs will be collected at each marsh, such that duplicates for channel center and edge grabs will be collected for each channel order in each sampling season. Sediment samples will be frozen in collection jars. Sediment samples will be analyzed for mercury, methylmercury, TOC, grainsize, and sulfide. Dissolved oxygen and pH will be measured in situ at the sediment surface.

Bioaccumulation

Spatial and temporal variations in the distribution of mercury and methylmercury may result in observable effects on mercury distributions in biota. Hypothesized spatial and temporal patterns within marshes will be evaluated with nonmigratory, lower trophic level species, including bivalves, amphipods, and crayfish. These species are all important components of the diet for clapper rail and other marsh inhabitants. Benthic species will be evaluated as potential indicators of variation with channel order and season. Within each marsh, three replicate composite samples (with multiple individuals in each composite) will be collected in a first, second, and third order channel.

Variation between marshes will be evaluated with lower trophic level species (bivalves, amphipods, and crayfish), fish, and clapper rails. Target fish species include inland silversides, staghorn sculpin, prickly sculpin, juvenile striped bass, and yellowfin goby. Inland silversides should be present in all of the marshes and have been found to be an effective indicator of mercury distribution by Slotton et al. (1999). The other fish species are abundant predators that reside in the marshes and would be expected to accumulate relatively high mercury concentrations. Sculpin and striped bass are successfully being sampled in a separate SFEI study of two marshes in San Pablo Bay. Small fish (silversides) will be analyzed as multiindividual composites. Striped bass are larger and less abundant and will be analyzed as individuals. Compositing strategies will be employed for the other species depending on their abundance. Fish will be sampled once per year in the summer using an otter trawl in the larger channels and beach seines or other devices in the smaller channels.

Clapper rail eggs that fail to hatch will be collected and analyzed for methylmercury We will investigate the relationship between regional variation in rail eggs and concentrations in prey and methylmercury production in sediment and water. Clapper

rail eggs will be collected once per year in each marsh. Stilt eggs may be sampled in areas without rails.

In all biological samples we will analyze methylmercury. Methylmercury is the form that is most toxic and efficiently transferred through the food web. In addition, stable nitrogen and carbon isotopes will be analyzed as indicators of trophic position. Variation in food web structure among the marshes could potentially confound our results. Collecting the isotope data will allow us to factor out inter- or intra-marsh variation that is caused by variation in food web structure.

DATA HANDLING AND DISSEMINATION

All data generated in the field and through laboratory analyses will formatted and kept on a microcomputer database server at SFEI. The server is backed up weekly and copies kept offsite. Subsets of the data can be generated and exported to common formats for use by collaborators and other interested parties.

The outcome of this study will be summarized in a final report at the conclusion of the project. Portions of this study will be prepared and submitted as manuscripts for publication in peer-reviewed journals. Versions of these reports will also be provided for the interested public on the SFEI website. Presentations will also be made prior to completion on an annual basis at regional and national scientific conferences such as NorCal and National SETAC.

WORK SCHEDULE

Figure 2 presents the proposed work schedule for this project.

FEASIBILITY

The collection methods and analyses described for sediment and water samples have been used previously in studies of mercury and methylmercury in other fresh and marine environments (Benoit et al. 1998; Gilmour et al. 1998; Mason and Lawrence 1999). Sampling sites are on public lands, and sampling is neither so extensive nor so frequent that lasting observable impacts on the sites would be expected. Eggs of endangered birds are collected only if found non-viabie.

APPLICABILITY TO CALFED ERP GOALS

This proposal addresses an information gap on the extent and impact of mercury contamination in tidal wetlands. It will complement past and current efforts investigating mercury contamination in the Delta. We will directly be investigating mercury impacts on an endangered bird species (California clapper rail) and bioaccumulation in a sportfish (striped bass) commonly consumed by humans. However benefits of this information extend beyond these particular species; by measuring mercury in organisms from lower trophic levels and in tidal marsh sediments and waters, we hope to come to a better understanding of mechanisms by which harmful levels of mercury accumulate in these and potentially other species which inhabit tidal marshes during part or all of their life cycles. In this project, we aim to develop a template by which the degree and extent of mercury contamination might be evaluated in tidal wetlands. We also seek to identify particular factors that would indicate a high risk for mercury contamination and bioaccumulation in wetlands, which would allow managers to make appropriate decisions on how to manage or avoid such risks in choosing and designing restoration projects.

Previous CALFED recipients are listed with their respective qualifications.

QUALIFICATIONS

Donald Yee, Ph.D., SFEI, Assistant Environmental Scientist
Donald Yee will be serving as lead manager on this project. He is the Quality Assurance Officer for SFEI and is currently managing a project measuring organic contaminants in effluents from wastewater treatment plants. He is also advising a Regional Monitoring Program pilot study on atmospheric deposition of mercury (including one site on the national Mercury Deposition Network and other contaminants. Dr. Yee received his B.S. in Chemical Engineering and his Ph.D. in Environmental Engineering from M.I.T. His dissertation research focused on competitive interactions of trace metals on phytoplankton. Prior to joining SFEI in 1999, he has had experience in post-doctoral research on carbon geochemistry and consulting in the private sector on environmental regulatory policy.

Joshua N. Collins, Ph.D., SFEI, Environmental Scientist
Dr. Collins received his Ph.D. in Entomological Sciences at the University of California at Berkeley and has done post-doctoral studies in Geography and Ecology at the University of California at Berkeley and Davis. Dr. Collins is a landscape ecologist and regional ecological planner with special expertise in the evolution and natural maintenance of streams and wetlands. Dr. Collins has been a professional ecologist in the Public Utilities Industry and a consulting ecologist in private practice for design and review of stream and wetland restoration projects. Since Dr. Collins joined the staff of SFEI in 1993, he has been the principal author and lead scientist for the Bay Area Wetlands Monitoring Plan, the Bay Area Watersheds Science Plan, the Bay Area EcoAtlas, and the Bay Area Regional Wetlands Ecosystem Goals Project. Dr. Collins oversees the SFEI Wetlands Science Program and GIS laboratory, and co-manages the Watersheds Science Program.

Jay A. Davis, Ph.D., SFEI, Environmental Scientist
Dr. Davis received his Ph.D. in Ecology at the University of California, Davis in 1997. He has worked on contaminant issues in the San Francisco Estuary since 1986. Dr. Davis has worked on contaminant issues in San Francisco Estuary since 1986. Dr. Davis worked for the Aquatic Habitat Institute from 1986 to 1992. During this period he co-authored several Institute reports, including Status and Trends Reports on Pollutants and Dredging and Waterway Modification for the San Francisco Estuary Project. He joined the staff of SFEI in 1995. Dr. Davis is part of a team that manages the Regional Monitoring Program for the San Francisco Estuary, managing three projects examining contaminants of human health concern in fish from the Bay, the Sacramento River watershed, and the Delta, is coauthoring CALFED white papers on Contaminants in Tidal Wetlands, and is co-investigator on a UC Davis project examining possible effects of contaminants on spittail.

Collaborators:
The following researchers will be collaborating on this project as subcontractors:

Roger Byrne, Ph.D., U.C. Berkeley, Associate Professor
Dr. Byrne will assist in the interpretation of contaminant horizons and timelines for this project. He obtained his B.A. in Geography from the University of London and an M.A. from the University of Calgary. He received his Ph.D. in Geography with a minor in Botany from the University of Wisconsin in 1972. He has been on the faculty of U.C. Berkeley since 1972. He is a curator at the U.C. Museum of Paleontology. His research interests include tracking climate change and signals from anthropogenic sources in sediments.

Todd E. Hopkins, Ph.D., Romberg Tiburon Center, SFSU
Acting NERR Program Manager
Dr. Hopkins will assist in experimental and interpretive aspects of the fish monitoring for this project. Todd Hopkins received his BA in Zoology from UC Berkeley in 1984 and conducted an undergraduate thesis on the distribution of fishes in San Pablo Creek. He went on to SF State for his MA and studied the feeding biology of rockfishes in Monterey Bay. While completing his PhD in Ecology at UC Davis
on the ecology and physiology of sharks and rays in Tomales Bay, Todd also studied the effects of tagging and transport stress on striped bass, the predation of squawfish on salmon smolts in the Columbia river, and the effects of El Niño on yellowtail rockfish off California. Todd moved to the University of Miami as a Post-doctoral researcher and studied on the effects of canals and freshwater inflows on nearshore fishes in Biscyane Bay. Todd then worked as the Research Coordinator for the Rookery Bay National Estuarine Research Reserve (NERR) in Naples, Florida, where he lead efforts to create regional partnerships between state, federal, and local organizations and he successfully created a consortium of regional water quality monitoring programs and a regional management-driven science plan for Southwest Florida. Todd's research at Rookery Bay focused on linking the effects of land and water management and restoration projects to the distribution and abundance of estuarine and coastal organisms and their habitats.

Steven Schwarzbach, Ph.D., U S. Fish and Wildlife Service
Chief, Environmental Contaminants Division
Dr. Schwarzback will lead the bird egg sampling portion of this project.
Dr. Schwarzbach serves as the chief of the Environmental Contaminants Division of the Sacramento Field Office, USFWS. He has designed and directed numerous multidisciplinary field studies of environmental contaminant impacts to fish and wildlife in California including studies in the Klamath Basin, Sacramento Valley, Tulare Basin, San Luis Refuge Complex, and intertidal marshes of San Francisco Bay. Contaminant studies in which Dr. Schwarzbach has been involved have focused on mercury, selenium, organophosphate pesticides, aquatic herbicides, organochlorines, trifluoracetic acid, acid mine drainage, ammonia, and eutrophication effects upon water quality. His personal scientific interests have most recently been particularly focused on mercury and selenium in birds of the San Joaquin Valley and San Francisco Bay. He has directed field investigations on contaminant hazards to clapper rails in the south bay in 1991 and 1992 and the north bay in 1998 and 1999 and is currently directing a baywide investigation of

mercury bioaccumulation in birds of San Francisco bay for the Regional Board, and mercury bioaccumulation in birds of the delta for CALFED.

BUDGET

Tie budget for this project is presented in the attached tables. Collaborators have been included as subcontractors for the purposes of this project; they are respected researchers in their fields, and will provide valuable expertise in sampling design, sampling, and interpretation of results for this project. Their qualifications and affiliations are presented in the previous section.

COMPLIANCE WITH STANDARD TERMS AND CONDITIONS

The applicant will comply with all state and federal standard terms.

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FIGURE 1

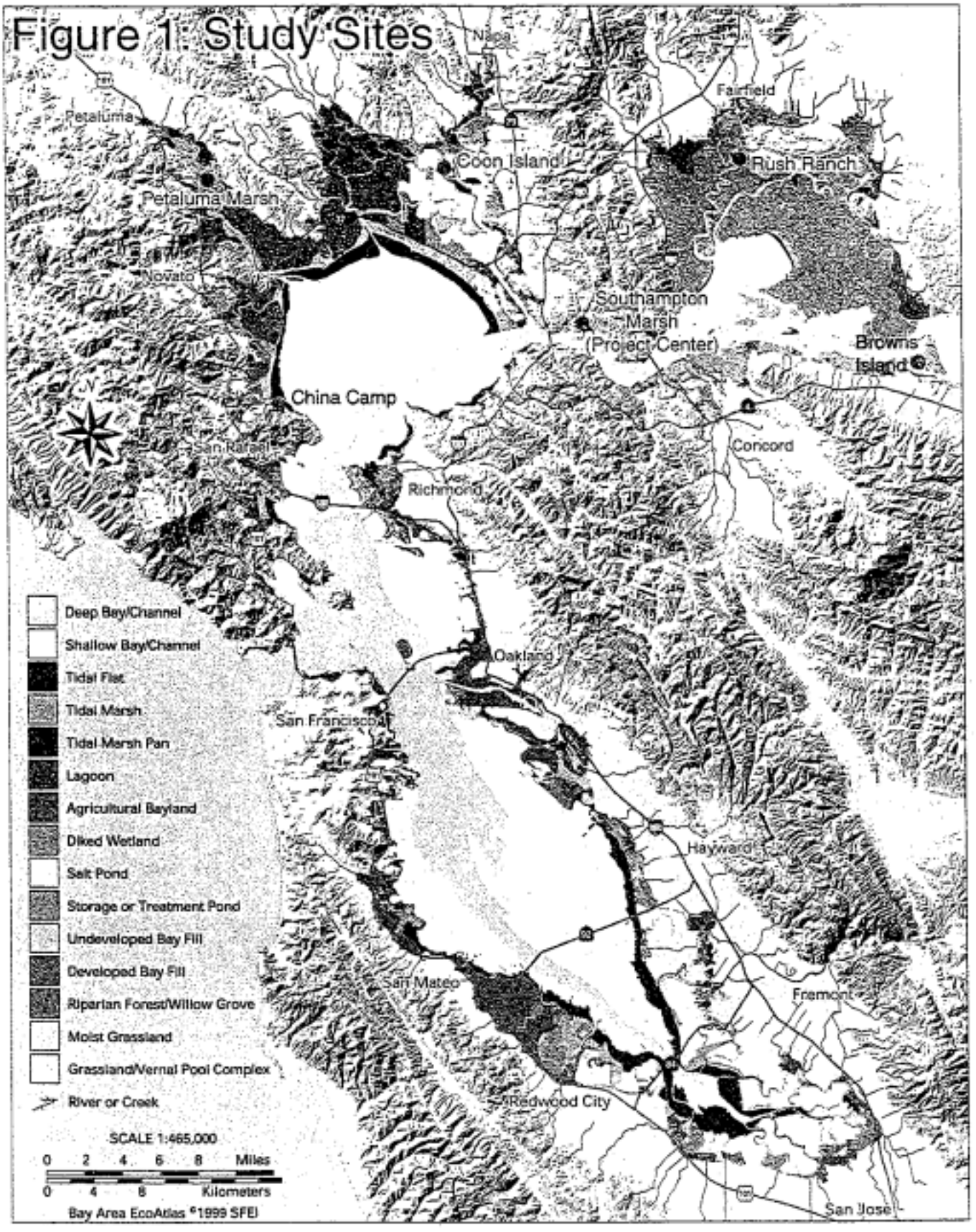
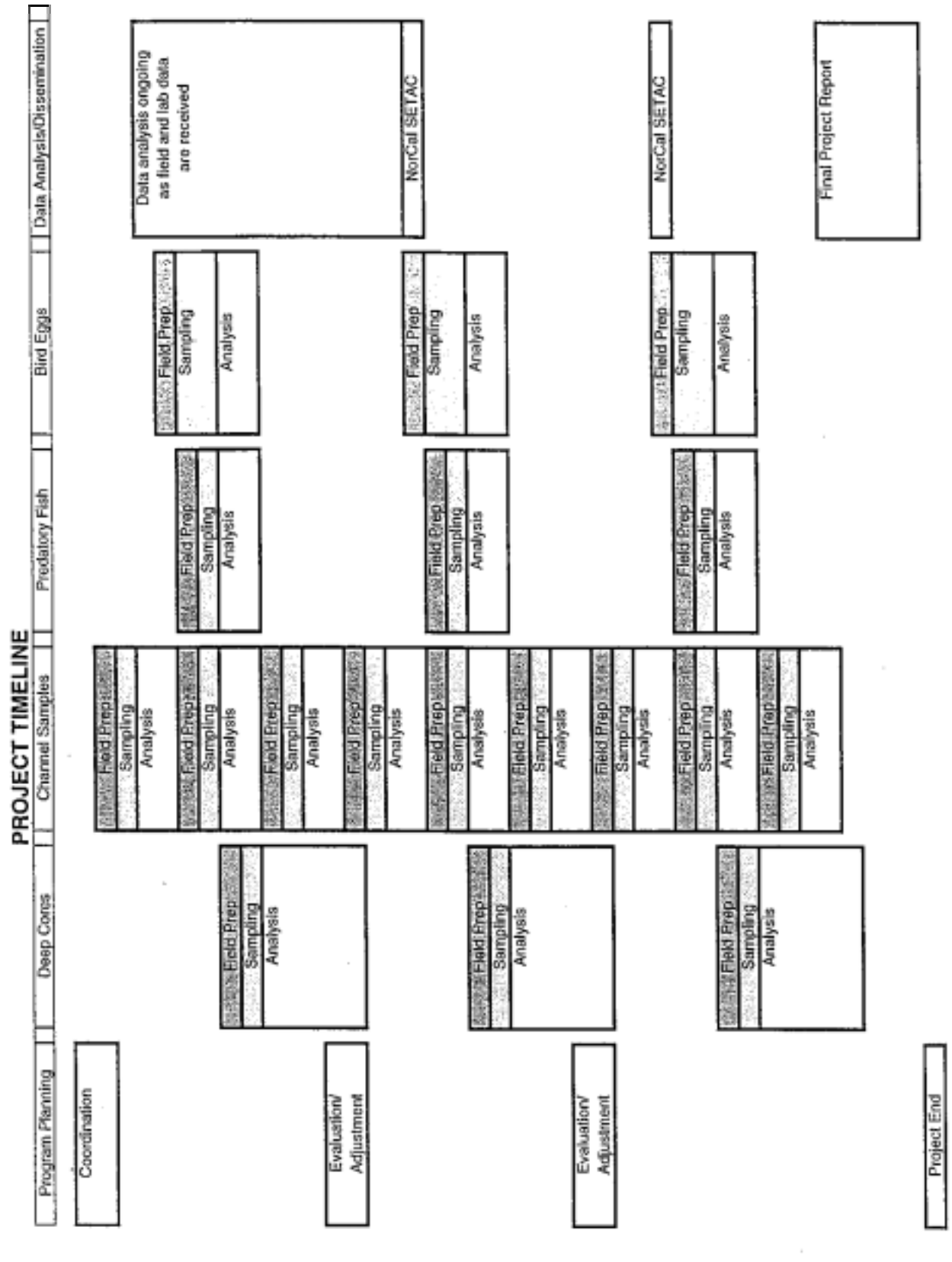


Figure 1: Study Sites
Napa
Petaluma
Fairfield
Coon Island
Rush Ranch
Petaluma Marsh
Novato
Southampton Marsh (Project Center)
Browns Island
China Camp
San Rafael
Concord
Richmond
Oakland
San Francisco
Hayward
San Mateo
Fremont
Redwood City
San Jose
Deep Bay/Channel
Shallow Bay/Channel
Tidal Flat
Tidal Marsh
Tidal Marsh Pan
Lagoon
Agricultural Bayland
Diked Wetland
Salt Pond
Storage or Treatment Pond
Undeveloped Bay Fill
Developed Bay Fill
Riparian Forest/Willow Grove
Moist Grassland
Grassland/Vernal Pool Complex
River or Creek
SCALE 1:465,000
0 2 4 6 8 Miles
0 4 8 Kilometers
Bay Area EcoAtlas ©1999 SFEI

Figure 2. Timeline



		Subject to Overhead						Exempt from Overhead		
Task-Year 1	Direct Labor Hours	Salary	Benefits	Travel	Supplies & Expendables	Service Contracts	Overhead (show % here)	Equipment	Graduate Student Fee Remission	Total Cost
1 Deep cores										$ -
1a collection	$ 200.00	$4,604.36	$ 849.96	$ 1,500.00	$ 8,150.00		$ 4,904.48			$ 20,008.81
1b analysis	$ 700.00	$ 16,115.00	$ 2,974.63		$ 24,300.00		$ 6,740.62			$ 50,130.45
2 Marsh channels							$ -			$ -
2a collection	$ 900.00	$ 22,940.35	$ 4,234.79				$ 9,595.54			$ 36,770.68
2b water analysis					$ 23,400.00		$ -			$ 23,400.00
2c sediment analysis					$ 43,200.00		$ -			$ 43,200.00
2d invertebrate analysis					$ 67,840.00		$ -			$ 67,840.00
2e benthic fish analysis							$ -			$ -
3 Predator fish						$ 11,770.00				$ 11,770.00
3a collection							$ -			$ -
3b analysis							$ -			$ -
4 Clapper rail						$ 88,061.00				$ 88,061.00
4a collection							$ -			$ -
4b analysis							$ -			$ -
5 Data Formatting & Ma	$ 220.00	$ 10,771.82	$ 1,988.48							$ 12,760.30
6 Data analysis & dissemination		$5,634.79	$ 1,040.16				$ 4,170.82			
7 Project Management	$ 240.00						$ -			$ -
Year 1		$ 60,066.32	$ 11,088.24	$ 1,500.00	$ 166,890.00	$ 99,831.00	$ 25,411.46	$ -	$ -	$ 353,941.23

Task-Year 2	Direct Labor Hours	Salary	Benefits	Travel	Supplies & Expendables	Service Contracts	Overhead (show % here)	Equipment	Graduate Student Fee Remission	Total Cost
1 Deep cores										$ -
1a collection	$ 200.00	$4,035.63	$ 892.86	$ 1,500.00	$ 650.00		$ 5,150.83			$ 13,029.11
1b analysis	$ 700.00	$ 18,920.75	$ 3,123.57		$ 24,300.00		$ 7,077.65			$ 51,421.97
2 Marsh channels							$ -			$ -
-2a collection	$ 900.00	$ 24,087.00	$ 4,446.46				$ 10,075.16			$ 38,608.62
2b water analysis					$ 23,400.00		$ -			$ 23,400.00
2c sediment analysis					$ 43,200.00		$ -			$ 43,200.00
-2d invertebrate analysis					$ 67,840.00		$ -			$ 67,840.00
2e benthic fish analysis							$ -			$ -
3 Predator fish						$ 11,770.00				$ 11,770.00
3a collection							$ -			$ -
3b analysis							$			$
4 Clapper rail						$ 88,061.00				$ 88,061.00
4a collection										
4b analysis										
5 Data Formatting & Mol	$ 220.00	$ 10,771.82	$ 1,988.48							$ 12,760.30
6 Data analysis & dissemination		$5,634.79	$ 1,040.18				$ 4,170.02			
7 Project Management	$ 240.00						$			$
Year 2		$ 62,249.99	$ 11,491.35	$ 1,500.00	$ 159,390.00	$ 99,831.00	$ 26,474.46	$ -	$ -	$ 350,091.01

Task-Year 3	Direct Labor Hours	Salary	Benefits	Travel	Supplies & Expendables	.	Overhead (show % here)	Equipment	Graduate Student Fee Remission	Total Cost
1 Deep cores						$ 2,000.00				$ 2,000.00
1a collection	$ 200.00	$5,320.26	$ 982.12	$ 1,500.00	$ 650.00		$ 5,667.05			$ 14,119.43
1b analysis	$ 700.00	$ 17,766.79	$ 3,279.75		$ 24,300.00		$ 7,431.53			$ 52,778.07
2 Marsh channels							$ -			$ -
-2a collection	$ 900.00	$ 25,291.35	$ 4,668.78				$ 10,578.92			$ 40,539.06
2b water analysis					$ 23,400.00		$ -			$ 23,400.00
2c sediment analysis					$ 43,200.00		$ -			$ 43,200.00
-2d invertebrate analysis					$ 67,840.00		$ -			$ 67,840.00
2e benthic fish analysis							$ -			$ -
3 Predator fish						$ 11,770.00				$ 11,770.00
3a collection							$ -			$ -
3b analysis							$ -			$ -
4 Clapper rail						$ 88,061.00				$ 88,061.00
4a collection							$ -			$ -
4b analysis							$ -			$ -
5 Data Formatting & Ma	$ 220.00	$ 10,771.82	$ 1,988.48							$ 12,760.30
6 Data analysis & dissemination		$5,634.79	$ 1,040.18				$ 4,170.82			
7 Project Management	$ 240.00						$ -			$ -
Year 2		$ 64,785.01	$ 11,959.31	$ 1,500.00	$ 159,390.00	$ 101,831.00	$ 27,848.32	$ -	$ -	$ 356,467.85

STATE OF CALIFORNIA

NONDISCRIMINATION COMPLIANCE STATEMENT

STD. 19 (REV. 3-95) FMC

COMPANY NAME

SAN FRANCISCO ESTUARY INSTITUTE

The company named above (hereinafter referred to as "prospective contractor") hereby certifies, unless specifically exempted, compliance with Government Code Section 12990 (a-f) and California Code of Regulations, Title 2, Division 4, Chapter 5 in matters relating to reporting requirements and the development, implementation and maintenance of a Nondiscrimination Program. Prospective contractor agrees not to unlawfully discriminate, harass or allow harassment against any employee or applicant for employment because of sex, race, color, ancestry, religious creed, national origin, disability (including HIV and *AIDS)*, medical condition (cancer), age, marital status, denial of family and medical care leave and denial of pregnancy disability leave.

CERTIFICATION

I, the official named below, hereby swear that I am duly authorized to legally bind the prospective contractor to the above described certification. I am fully aware that this certification, executed on the date and in the county below, is made under penalty of perjury under the laws of the State of California

OFFICIAL'S NAME

Margaret R. Johnston

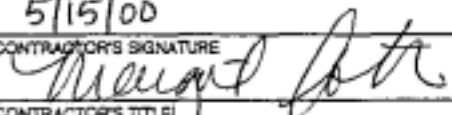
DATE EXECUTED

5/15/00

EXECUTED IN THE COUNTY OF

Contra Costa County

PROSPECTIVE CONTRACTOR'S SIGNATURE



PROSPECTIVE CONTRACTOR'S TITLE

Executive Director

PROSPECTIVE CONTRACTOR'S LEGAL BUSINESS NAME

San Francisco Estuary Institute

APPLICATION FOR FEDERAL ASSISTANCE

OM8 Approval Nu. 0348-0043

2. DATE SUBMITTED	Applicant Identifier
May 12, 2000	

1. TYPE OF SUBMISSION:		3. DATE RECEIVED BY STATE	State Application Identifier
Application ☐ Construction ☐ Non-Construction	Preappiicafion ☐ Construction ☐ Non-Construction	4. DATE RECEIVED BY FEDERAL AGENCY	Federal Identifier

5. APPLICANT INFORMATION

Legal Name: San Francisco Estuary Institute

Organizational Unit:

Address *(give city, county,* State, *and zip code):* 1325 S. 46th Street, Contra Costa County Richmond, CA 94804

Name and telephone number oi person to be Contacted on matters involving this application *(give area* code) Margaret R. Johnston, (510) 231-9539

6. EMPLOYER IDENTIFICATION NUMBER *(EIN):* 94-2951373

7. TYPE OF APPLICANT *(enter appropriate letter in* **box)** N

A. State
B. County
C. Municipal
D. Township
E. Interstate
F. Intermunicipal
G. Special District
H. Independent School Dist.
I. Stale Controlled Institution of Higher Learning
J. Private University
K. Indian Tribe
L. Individual
M. Profit Organization
N. Other (Specify) Non profit Research

8. TYPE OF APPLICATION:

☑ New ☐ Continuation ☐ Revision

If Revision. enfer appropriate letter(s) in box(es) ☐ ☐

A. Increase Award B. Decrease Award C. increase Duration
D. Decrease Duration Other *(specify):*

9. NAME OF FEDERAL AGENCY

10. CATALOG OF FEDERAL DOMESTIC ASSISTANCE NUMBER: ☐☐-☐☐☐

TITLE

11. DESCRIPTIVE TITLE OF APPLICANT'S PROJECT

Distribution Patterns of Mercury and Methylmercury in Tidal Wetland Ecosystems of North San Francisco Bay

12. AREAS AFFECTED BY PROJECT *(Cities, Counties.* States, *etc.):* COUNTIES IN CALIFORNIA – MARIN, SONOMA, NAPA, SOLANO, CONTRA COSTA

13. PROPOSED PROJECT		14. CONGRESSIONAL DISTRICTS OF: 1, 6, 7-9, 12-15, 10	
Start Date	Ending Date	a. Applicant	b. Project

15. ESTIMATED FUNDING:

a. Federal	$	1,060,500 00
b. Applicanf	$	00
c. State	$	00
d. Local	$	00
e. Other	$	00
f. Program income	$	00
g. TOTAL	$	1,060,500 00

16. IS APPLICATION SUBJECTTO REVIEW BY STATE EXECUTIVE ORDER 12372 PROCESS?

a. YES. THIS PREAPPLICATION/APPLICATION WAS MADE AVAILABLE TO THE STATE EXECUTIVE ORDER 12372 PROCESS FOR REVIEW ON:

DATE _____

b. No. ☐ PROGRAM IS NOT COVERED BY E. O. 12372
☐ OR PROGRAM HAS NOT BEEN SELECTED BY STATE FOR REVIEW

17. IS THE APPLICANT DELINQUENT ON ANY FEDERAL DEBT?

☐ Yes If "Yes," attach an explanation. ☒ No

18. TO THE BEST OF MY KNOWLEDGE AND BELIEF, ALL DATA IN THIS APPLICATION/PREAPPLICATION ARE TRUE AND CORRECT, THE DOCUMENT HAS BEEN DULY AUTHORIZED BY THE GOVERNING BODY OF THE APPLICANT AND THE APPLICANT WILL COMPLY WITH THE ATTACHED ASSURANCES IF THE ASSISTANCE IS AWARDED.

a. Type Name of Authorized Representative	b. Title	c. Telephone Number
Margaret R. Johnston	Executive Director	(510) 231-9539
d. Signature of Authorized Representative: Margaret Johnston		e. Date Signed 5/15/00

Previous Edition Usable
Authorized for Local Reproduction

Standard Form 424 (Rev. 7-97)
Prescribed by OMB Circular A-102

BUDGET INFORMATION - Non-Construction Programs

OMB Approval No. 0348-0044

SECTION A - BUDGET SUMMARY

Grant Program Function or Activity (a)	Catalog of Federal Domestic Assistance Number (b)	Estimated Unobligated Funds		New or Revised Budget		
		Federal (c)	Non-Federal (d)	Federal (e)	Non-Federal (f)	Total (g)
1.		$	$	$	$	$
2.						
3.						
4.						
5. Totals		$	$	$	$	$

SECTION B - BUDGET CATEGORIES

6. Object Class Categories	GRANT PROGRAM, FUNCTION OR ACTIVITY (1)	(2)	(3)	(4)	Total (5)
a. Personnel	$ 60,066	$ 62,250	$ 64,785	$	$
b. Fringe Benefits	11,088	11,491	11,959		
c. Travel	1500	1,500	1,500		
d. Equipment					
e. Supplies	166,890	159,390	159,390		
f. Contractual	99,831	99,831	101,831		
g. Construction					
h. Other					
i. Total Direct Charges (sum of 6a-6h)					
j. Indirect Charges	25,411	26,475	27,848		
k. TOTALS (sum of 6i and 6j)	$ 353,941	$ 350,091	$ 356,468	$	$ 1,060,500
7. Program Income	$	$	$	$	$

Authorized for Local Reproduction

Standard Form 424A (Rev. 7-97)
Prescribed by OMB Circular A-102

Previous Edition Usable

SECTION C - NON-FEDERAL RESOURCES

(a) Grant Program	(b) Applicant	(c) State	(d) Other Sources	(e) TOTAL
8.	$	$	$	$
9.				
10.				
11.				
12. TOTAL *(sum of lines 8-11)*	$	$	$	$

SECTION D - FORECASTED CASH NEEDS

	Total for 1st Year	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
13. Federal	$ 353,941	$ 88,485	$ 88,485	$ 88,485	$ 88,485
14. Non-Federal					
15. TOTAL *(sum of lines 13 and 14)*	$ 353,941	$ 88,485	$ 88,485	$ 88,485	$ 88,485

SECTION E - BUDGET ESTIMATES OF FEDERAL FUNDS NEEDED FOR BALANCE OF THE PROJECT

(a) Grant Program	FUTURE FUNDING PERIODS (Years)			
	(b) First	(c) Second	(d) Third	(e) Fourth
16.	$	$	$	$
17.				
18.				
19.				
20. TOTAL *(sum of lines 16-19)*	$	$	$	$

SECTION F - OTHER BUDGET INFORMATION

21. Direct Charges:	22. Indirect Charges:
23. Remarks:	

OMB Approval No. 0348-0040

ASSURANCES - NON-CONSTRUCTION PROGRAMS

PLEASE DO NOT RETURN \'OUR COMPLETED FORM TO THE OFFICE OF MANAGEMENT AND BUDGET. SEND IT TO THE ADDRESS PROVIDED BY THE SPONSORING AGENCY.

NOTE: Certain of these assurances may not be applicabie to your project or program. If you have questions. please contact. the awarding agency. Further. certain Federal awarding agencies may require applicants to certify to additional assurances. I such is the case, you will be notified.

As the duly authorized representative of the applicant, I certify that the applicant:

1. Has the legal authority to apply for Federal assistance and the institutional. managerial and financial capability (including funds sufficient to pay the non-Federal share of project cost) to ensure proper planning, management and completion of the project described in this application.

2. Will' give the awarding agency,, the Cemptroller General of the United States and. if appropriate. the State, through any authorized representative. access to and the right to examine ail records, books, papers, or documents related to the award; and will establish a proper accounting system in accordance with generally accepted accounting standards or agency directives.

3. Will establish safeguards to prohibit employees from using their positions for a purpose that constitutes or presents the appearance of personal or organizational conflict of interest, or personal gain.

4. Wiil initiate and complete the work within the applicabie time frame after receipt of approval of the awarding agency.

5 Will comply with the Intergovernmental Personnel Act of 1970 (42 U.S.C. §§4728-4763) relating to prescribed standards for merit systems for programs funded under one of the 19 statutes or regulations specified in Appendix A of OPM's Standards for a Merit System of Personnel Administration (5C.F.R. 900, Subpart F).

6 Will comply with all Federal statutes relating to nondiscrimination. These inciude but are not limited to: (a) Title VI of the Civil Rights Act of 1964 (P.L. 88-352) which prohibits discrimination on the basis of race, color or national origin; (b) Title IX of the Education Amendments of 1972. as amended (20 U.S.C. §§1681-1683, and 1685-1686), which prohibits discrimination on the basis of sex: (c) Section 504 of the Rehabilitation Act of 1973, as amended (29 U.S.C. 5794). which prohibits discrimination on the basis of handicaps; (d) the Age Discrimination Act of 1975, as amended (42 U.S.C. 556101-6107). which prohibits discrimination on the basis of age; (e) the Drug Abuse Office and Treatment Act of 1972 (P.L. 92-255). as amended, relating to nondiscrimination on the basis of drug abuse; (f) the Comprehensive Alcohol Abuse and Alcoholism Prevention, Treatment and Rehabilitation Act of 1970 (P.L. 91-616), as amended, relating to nondiscrimination on the basis of alcohol abuse or alcoholism: (g) §§523 and 527 of the Public Health Service Act of 1912 (42 U.S.C. §§290 dd-3 and 290 ee **3).** as amended, reiating to confidentiality of alcohol and drug abuse patient records; (h) Title VIII of the Civil Rights Act of 1968 (42 U.S.C. §§3601 et seq.), as amended, relating to nondiscrimination in the sale, rental or financing of housing; (i) any. other nondiscrimination provisions in the specific statute(s) under which application for Federal assistance is being made; and, (j) the requirements of any other nondiscrimination statute(s) which may apply to the appiication.

7 Will comply, or has already complied, with the requirements of Titles II and III of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (P.L. 91-646) which provide for fair and equitable treatment of persons displaced or whose property is acquired as a result of Federal or federally-assisted programs. These requirements apply to all interests in real property acquired for project purposes regardless of Federal participation in purchases.

8. Will comply, as applicable, with provisions of the Hatch Act (5 U.S.C. §§1501-1508 and 7324-7328) which limit the political activities of employees whose principal employment activities are funded in whole or in part with Federal funds.

9. Will comply.. as applicable. with the provisions of the Davis-Bacon Act (40 U.S.C. §§276a to 276a-7), the Copeland Act (40 U.S.C. §276c and 18 U.S.C. 5874). and the Contract Work Hours and Safety Standards Act (40 U.S.C. §§327-333), regarding labor standards for federally-assisted construction subagreements.

10. Will comply, if applicable, with flood insurance purchase requirements of Section 102(a) of the Flood Disaster Protection Act of 1973 (P.L. 93-234) which requires recipients in a special flood hazard area to participate in the program and to purchase flood insurance if the total cost of insurable construction and acquisition is $10,000 or more.

11. Will comply with environmental standards which may be prescribed pursuant to the following: (a) institution of environmental quality control measures under the National Environmental Policy Act of 1969 (P.L. 91-190) and Executive Order (EO) 11514: (b) notification of violating facilities pursuant to EO 11738; (c) protection of wetlands pursuant to EO 11990: (d) evaluation of flood hazards in floodplains in accordance with EO 11988: (e) assurance of project consistency with the approved State management program developed under the Coastal Zone Management Act of 1972 (16 U.S.C. §§1451 et seq.): (f) conformity of Federal actions to State (Clean Air) Implementation Plans under Section 176(c) of the Clean Air Act of 1955. as amended (42 U.S.C. §§7401 et seq.); (g) protection of underground sources of drinking water under the Safe Drinking Water Act of 1974, as amended (P.L. 93-523); and, (h) protection of endangered species under the Endangered Species Act of 1973. as amended (P.L. 93-205).

12. Will comply with the Wild and Scenic Rivers Act of 1968 (16 U.S.C. §§1271 et seq.) related to protecting components or potential components of the national wild and scenic rivers system.

13. Will assist the awarding agency in assuring compliance with Section 106 of the National Historic Preservation Act of 1966, as amended (16 U.S.C. §470), EO 11595 (identification and protection of historic propenies). and the Archaeological and Historic Preservation Act of 1974 (16 U.S.C. §§469a-1 et seq.).

14. Will comply with P.L. 93-348 regarding the protection of human subjects involved in research, development. and related activities supported by this award of assistance.

15. Will comply with the Laboratory Animal Welfare Act of 1966 (P.L. 89-544, as amended, 7 U.S.C. §§2131 et seq.) pertaining to the care, handling, and treatment of warm blooded animals held for research, teaching, or other activities supported by this award of assistance.

16. Will comply with the Lead-Based Paint Poisoning Prevention Act (42 U.S.C. §§4801 et seq.) which prohibits the use of lead-based paint in construction or rehabilitation of residence Structures.

17. Will cause to be performed the required financial and compliance audits in accordance with the Single Audit Act Amendments of 1996 and OMB Circular No. A-133. 'Audits of States. Local Governments, and Non-Profit Organizations.'

18. Will comply with all applicable requirements of all other Federal laws. executive orders, regulations, and policies governing this program.

SIGNATURE OF AUTHORIZED CERTIFYING OFFICIAL	TITLE
Margaret R. Johnston	Margaret R. Johnston Executive Director
APPLICANT ORGANIZATION	DATE SUBMITTED
San Francisco Estuary Institute	May 12, 2000

U.S. Department of the Interior

Certifications Regarding Debarment, Suspension and Other Responsibility Matters, Drug-Free Workplace Requirements and Lobbying

Persons signing this form should refer to the regulations referenced below for complete instructions:

Certification Regarding Debarment. Suspension. and Other Responsibility Matters - Primary Covered Transactions - The prospective primary participant further agrees by submitting this proposal that it will include ;he clause titled. "Certiiication Regarding Debarment. Suspension. Ineligibility and Voluntary Exclusion - Lower Tier Covered Transaction," provided by the department or agency entering into this covered transaction, without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions. See below for language to be used: use this form for certificatioh and sign: or use Department oi the Interior Form 1954 (DI-19541. (See Appendix A oi Subpart D of 43 CFR Parr 12.)

Certiiication Regarding Debarment. Suspension. Ineligibility and Voluntary Exclusion - Lower Tier Covered Transactions. (See Appendix B oi Subpart D of 33 CFR Part 12.1

Certification Regarding Drug-Free Workplace Requirements - Alternate I. (Grantees Other Than Individuals) and Alternate II. (Grantees Who are Individuals1 - (See Appendix C of Subpart D of 43 CFR Part 12.)

Signature on this form provides for compliance with certiiication requirements under 43 CFR Parts 12 and 18. The certiiications shall be treated as a material representation of fact upon which reliance will be placed when the Deparrment of the Interior determines to award the covered transaction. grant, cooperative agreement or loan.

PART A: Certification Regarding Debarment, Suspension, and Other Responsibility Matters Primary Covered Transactions

CHECK ✓ IF THIS CERTIFICATION IS FOR A PRIMARY COVERED TRANSACTION AND IS APPLICABLE.

(1) The prospective primary participant certifies to the best of its knowledge and belief. that it and its principals:

(a) Are not presently debarred, suspended, proposed for debarment. declared ineligible. or voluntarily excluded from covered transactions by any Federal department or agency:

(b) Have not within a three-year period preceding this proposal been convicted Of or had a civil judgment rendered against them for commission oi fraud or a criminal offense in connection with obtaining, attempting to obtain. or performing a public (Federal. State or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement. theft, forgery. bribery, falsification or destruction of records, making false statements, or receiving stolen property;

(c) Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal. Stare or local) with commission of any of the offenses enumerated in paragraph (1)(b) of this certification; and

id) Have not within a three-year period preceding this application/proposal had one or more public transactions (Federal, State or local) terminated for cause or default.

121 Where the prospective primary participant is unable to certify to any oi the statements in this certification, such prospective participant shall attach an explanation to this proposal.

PART B: Certification Regarding Debarment. Suspension, Ineligibility and Voluntary Exclusion - Lower Tier Covered Transactions

CHECK __ IF THIS CERTIFICATION IS FOR A LOWER TIER COVERED TPANSACTION AND IS APPLICABLE.

(1) The prospective lower tier participant certifies. by submission of this proposal. that neither it nor its principals is presently debarred, suspended, proposed for debarment. declared ineligible, or voluntarily excluded from participation in this transaction by any Federal department or agency.

(2) Where the prospective lower tier participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

DI-2010
March 1995
(This form consolidates DI-1953, DI-1954, DI-1955. DI-1956 and DI-19631

PART C: Certification Regarding Drug-Free Workplace Requirements

CHECK ✓ IF THIS CERTIFICATION IS FOR AN APPLICANT WHO IS NOT AN INDIVIDUAL

Alternate I. [Grantees Other Than individuals)

A. The grantee certifies that it will or continue to provide a drug-free workplace by:

(a) Publishing a statement notifying employees that the unlawful manufacture. distribution. dispensing, possession, or use of a controlled substance is prohibited in the grantee's workplace and specifying the actions that will be taken against employees for violation of such prohibition;

(b) Establishing an ongoing drug-free awareness program to inform employees about--
[1] The dangers of drug abuse in the workpiace;
(2) The grantee's policy of maintaining a drug-free workplace:
131 Any available drug counseling, rehabilitation, and employee assistance programs; and
(4) The penalties that may be imposed upon employees for drug abuse violations occurring in the workplace;

(c) Making it a requirement that each employee to be engaged in the performance of the grant be given a copy of the statement required by paragraph (a);

(d) Notifying the employee in the statement required by paragraph (a) that, as a condition of employment under the grant, the employee will --
(1) Abide by the terms of the statement: and
121 Notify the employer in writing of his or her conviction for a violation of a criminal drug statute occurring in the workplace no later than five calendar days after such conviction:

le) Notifying the agency in writing. within ten calendar days after receiving notice under subparagraph (d)(2) from an employee or otherwise receiving actual notice of such conviction. Empioyers of convicted employees must provide notice, including position title, to every grant officer on whose grant activity the convicted employee was working, unless the Federal agency has designated a central point for the receipt of such notices. Notice shall include the identification number(s) of each affected grant;

If] Taking one of the following actions, within 30 calendar days of receiving notice under subparagraph (d)(2), with respect to any employee who is so convicted --
(1) Taking appropriate personnel action against such an employee, up to and including termination. consistent with the requirements of the Rehabilitation Act of 1973, as amended; or
(2) Requiring such employee to participate satisfactorily in a drug abuse assistance or rehabilitation program approved for such purposes by a Federal, Stare. or local health, law enforcement, or other appropriate agency;

(g) Making a good faith effort to continue to maintain a drug-free workplace through implementation of paragraphs (a), (b), (c), (d), (e) and (f).

B. The grantee may insert in the space provided below the site(s) for the performance of work done in connection with the specific grant:

Place of Performance (Street address, city. county. state, zip code)

SAN FRANCISCO ESTUARY INSTITUTE
1325 SOUTH 46TH STREET
RICHMOND, CA 94804

Check __ if there are workplaces on file that are not identified here.

PART D: Certification Regarding Drug-Free Workplace Requirements

CHECK __ IF THIS CERTIFICATION IS FOR AN APPLICANT WHO IS AN INDIVIDUAL

Alternate II. (Grantees Who Are individuals)

(a) The grantee certifies that, as a condition of the grant, he or she will not engage in the unlawful manufacture, distribution. dispensing. possession, or use of a controlled substance in conducting any activity with the grant;

(b) If convicted of a criminal drug offense resulting from a violation occurring during the conduct of any grant activity. he or she will report the conviction. in writing, within 10 calendar days of the conviction, to the grant officer or other designee, unless the Federal agency designates a central point for the receipt of such notices. When notice is made to such a central point, it shall Include the identification numberis) of each affected grant.

PART E: Certification Regarding Lobbying
Certification for Contracts, Grants, **Loans,** and Cooperative Agreements

CHECK ✓ IF CERTIFICATION IS FOR THE AWARD OF ANY OF THE FOLLOWING AND THE AMOUNT EXCEEDS $ 100,000: A FEDERAL GRANT OR COOPERATIVE AGREEMENT, SUBCONTRACT, OR SUBGRANT UNDER THE GRANT OR COOPERATIVE AGREEMENT.

*CHECK __ IF CERTIFICATION IS FOR THE AWARD OF **A** FEDERAL LOAN EXCEEDING THE AMOUNT OF $ 150,000, OR A SUBGRANT OR SUBCONTRACT EXCEEDING $ 100,000. UNDER THE LOAN.*

The undersigned certifies. to the best of his or her knowledge and belief. that:

[1] No Federal appropriated funds have been paid or will be paid. by or on behalf of the undersigned, to any person for influencing or atrempting to influence an officer or employee of an agency, a Member of Congress, and officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract. the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension. continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

(2) If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or atrempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan. or Cooperative agreement. the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.

(3) The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers (including subcontracts, subgrants. and contracts under grants, loans, and cooperative agreements) and that all subrecipients shall certify accordingly.

This certification is a maierial representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by Section 1352, title 31, U.S. Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than $10,000 and nor more than $100,000 for each such failure.

As the authorized certifying official. I hereby certify that the above specified certifications are true.

SIGNATURE OF AUTHORIZED CERTIFYING OFFICIAL Margaret Johnston

TYPED NAME AND TITLE MARGARET R. JOHNSTON Executive Director

5/15/00

01.2010

March 1995

[This farm consolidates DI-1953, DI-1954, DI-1955. DI-1956 **and** DI-1963)

San *Francisco Estuary Institute*

180* Richmond *Field Station
1325 South 46th Street
Richmond. California 94804
Office (510) 231-9539
Fax (510) 231-9414

May 15,2000

Ms. Diane Sauer, Clerk
Marin County Board of Supervisors
3501 Civic Center Drive, Room 330
San Rafael, CA 94903

Dear Ms. Sauer:

Per instructions stated in the CALFED Bay-Delta Program, 2001 Proposal Solicitation Package, I have enclosed a copy of the San Francisco Estuary Institute's (SFEI) proposal entitled "Distribution Patterns of Mercury and Methylmercury in Tidal Wetland Ecosystems of North San Francisco Bay" for which we are seeking CALFED funding.

If you have any questions, please contact me at (510) 231-9532.

Sincerely,

Margaret R. Johnston
Executive Director

Enclosure

San Francisco Estuary Institute

180 Richmond Field Station
1325 South 46th Street
Richmond. California 94804
Office (510) 231-9539
Fax (510) 231-9414

May 15,2000

Mr. Alex Hinds, Director
Marin County Community Development Agency
3501 Civic Center Drive, Room 308
San Rafael, CA 94903

Dear Mr. Hinds:

Per instructions stated in the CALFED Bay-Delta Program, 2001 Proposal Solicitation Package, I have enclosed a copy of the San Francisco Estuary Institute's **(SFEI)** proposal entitled "Distribution Patterns of Mercury and Methylmercury in Tidal Wetland Ecosystems of North San Francisco Bay" for which we are seeking CALFED funding.

If you have any questions, please contact me at (510) 231-9532.

Sincerely,

Margaret R. Johnston
Executive Director

Enclosure

San Francisco Estuary Institute

180 Richmond Field Station
1325 South 46th Street
Richmond. California 94804
Office (5101231-9539
Fax (510) 231-9414

May 15,2000

Ms. Eeve Lewis, Clerk
Sonoma County Board of Supervisors
2300 County Center Drive, #177B
Santa Rosa, CA 95403

Dear Ms. Lewis:

Per instructions stated in the CALFED Bay-Delta Program, 2001 Proposal Solicitation Package, I have enclosed a copy of the San Francisco Estuary Institute's (SFEI) proposal entitled "Distribution Patterns of Mercury and Methylmercury in Tidal Wetland Ecosystems of North San Francisco Bay" for which we are seeking CALFED funding.

If you have any questions, please contact me at (510) 231-9532.

Sincerely,

Margaret R. Johnston
Executive Director

Enclosure

San Francisco Estuary Znstitute

180 Richmond* Field *Station
1325 South 46th Street
Richmond. California 94804
Office (510) 231-9539
Fax (510) 231-9414

May 15,2000

Mr. Chris Arnold, Director
Sonoma County Permit and Resource Management Department
2550 Ventura Avenue
Santa Rosa, CA 95403

Dear Mr. Arnold:

Per instructions stated in the CALFED Bay-Delta Program, 2001 Proposal Solicitation Package, I have enclosed a copy of the San Francisco Estuary Institute's (SFEI) proposal entitled "Distribution Patterns of Mercury and Methylmercury in Tidal Wetland Ecosystems of North San Francisco Bay" for which we are seeking CALFED funding.

If you have any questions, please contact me at (510) 231-9532,

Sincerely,

Margaret R. Johnston
Executive Director

Enclosure

San Francisco Estuary Institute

180 Richmond Field Station
1325 South 46th Street
Richmond. California 94804
Office (510) 231-9539
Fax (5101231-9414

May 15,2000

Ms. Mary Jean McLaughlin, Clerk
Napa County Board of Supervisors
1195 Third Street, #310
Napa, CA 94559

Dear Ms. McLaughlin:

Per instructions stated in the CALFED Bay-Delta Program, 2001 Proposal Solicitation Package, I have enclosed a copy of the San Francisco Estuary Institute's **(SFEI)** proposal entitled "Distribution Patterns of Mercury and Methylmercury in Tidal Wetland Ecosystems of North San Francisco Bay" for which we are seeking CALFED funding.

If you have any questions, please contact me at (510) 231-9532.

Sincerely,

Margaret R. Johnston
Executive Director

Enclosure

San Francisco Estuary Institute

180 Richmond Field Station
1325 South 46th Street
Richmond. California 94804
Office (510) 231-9539
Fax (510) 231-9414

May 15,2000

County of Napa
Conservation, Development, and Planning Department
1195 Third Street, #210
Napa, CA 94559

To Whom It May Concern:

Per instructions stated in the CALFED Bay-Delta Program, 2001 Proposal Solicitation Package, I have enclosed a copy of the San Francisco Estuary Institute's **(SFEI)** proposal entitled "Distribution Patterns of Mercury and Methylmercury in Tidal Wetland Ecosystems of North San Francisco Bay" for which we are seeking CALFED funding.

If you have any questions, please contact me at (510) 231-9532.

Sincerely,

Margaret R. Johnston
Executive Director

Enclosure

San Francisco Estuary Institute

180 Richmond Field Station
1325 South 46th Street
Richmond. California 94804
Office (510) 231-9539
Fax (510) 231-9414

May 15,2000

Ms. Maggie Jimenez, Clerk
Solano County Board of Supervisors
580 Texas Street
Fairfield, **CA** 94533

Dear Ms. Jimenez:

Per instructions stated in the CALFED Bay-Delta Program, 2001 Proposal Solicitation Package, I have enclosed a copy of the San Francisco Estuary Institute's (SFEI) proposal entitled "Distribution Patterns of Mercury and Methylmercury in Tidal Wetland Ecosystems of North San Francisco Bay" for which we are seeking CALFED funding.

If you have any questions, please contact me at (510) 231-9532.

Sincerely,

Margaret R. Johnston
Executive Director

Enclosure

San Francisco Estuary Institute

180 Richmond Field Station
1325 South **46th** Street
Richmond. California 94804
Office (510) 231-9539
Fax (510) 231-9414

May 15,2000

County of Solano
Department of Environmental Management
601 Texas Street
Fairfield. **CA** 94533

To Whom It May Concern:

Per instructions stated in the CALFED Bay-Delta Program, 2001 Proposal Solicitation Package, I have enclosed a copy of the San Francisco Estuary Institute's (SFEI) proposal entitled "Distribution Patterns of Mercury and Methylmercury in Tidal Wetland Ecosystems of North San Francisco Bay" for which we are seeking CALFED funding.

If you have any questions, please contact me at (510) 231-9532.

Sincerely,

Margaret R. Johnston
Executive Director

Enclosure

San Francisco Estuary Institute

180 Richmond Field Station
1325 South 46th Street
Richmond, California 94804
Office (510) 231-9539
Fax (510) 231-9414

May 15,2000

Mr. Phil Batchelor, Clerk
Contra Costa County Board of Supervisors
651 Pine Street
Martinez, CA 94553

Dear Mr. Batchelor:

Per instructions stated in the CALFED Bay-Delta Program, 2001 Proposal Solicitation Package, I have enclosed a copy of the San Francisco Estuary Institute's (SFEI) proposal entitled "Distribution Patterns of Mercury and Methylmercury in Tidal Wetland Ecosystems of North San Francisco Bay" for which we are seeking CALFED funding.

If you have any questions, please contact me at (510) 231-9532.

Sincerely,

Margaret R. Johnston
Executive Director

Enclosure

San Francisco Estuary Institute

180 Richmond *Field* Station
1325 South 46th Street
Richmond. California 94804
Office (510) 231-9539
Fax (510) 231-9414

May 15,2000

Mr. Dennis Barry
Contra Costa County Community Development Department
651 Pine Street, North Wing, Fourth Floor
Martinez, CA 94553

Dear Mr. Barry:

Per instructions stated in the CALFED Bay-Delta Program, 2001 Proposal Solicitation Package, I have enclosed a copy of the San Francisco Estuary Institute's (SFEI) proposal entitled "Distribution Patterns of Mercury and Methylmercury in Tidal Wetland Ecosystems of North San Francisco Bay" for which we are seeking CALFED funding.

If you have any questions, please contact me at (510) 231-9532.

Sincerely,

Margaret R. Johnston
Executive Director

Enclosure

San Francisco Estuary Institute

180 **Rehmond** ***Field*** **Station**
1325 South 46th Street
Richmond. California 94804
Office (510) 231-9539
Fax (5101231-9414

May 15,2000

Bay Conservation and Development Commission
50 California Street, #2600
San Francisco, CA 94111

To Whom It May Concern:

Per instructions stated in the CALFED Bay-Delta Program, 2001 Proposal Solicitation Package, I have enclosed a copy of the San Francisco Estuary Institute's (SFEI) proposal entitled "Distribution Patterns of Mercury and Methylmercury in Tidal Wetland Ecosystems of North San Francisco Bay" for which **we** are seeking CALFED funding.

If you have any questions, please contact me at (510) 231-9532

Sincerely,

Margaret R. Johnston
Executive Director

Enclosure

San Francisco Estuary Institute

180 Rehmond Hill Station
1325 South 46th Street
Richmond. California 94804
Office (510) 231-9539
Fax (510) 231-9414

May 15,2000

Delta Protection Commission
PO Box 530
Walnut Grove, CA 95690

To Whom It May Concern:

Per instructions stated in the CALFED Bay-Delta Program, 2001 Proposal Solicitation Package, I have enclosed a copy of the San Francisco Estuary Institute's (SFEI) proposal entitled "Distribution Patterns of Mercury and Methylmercury in Tidal Wetland Ecosystems of North San Francisco Bay" for which **we** are seeking CALFED funding.

If you have any questions, please contact me at (510) 231-9532.

Sincerely,

Margaret R. Johnston
Executive Director

Enclosure

Environmental Compliance Checklist

All applicants must fill out this Environmental Compliance Checklist. Applications must contain answers to the following questions to be responsive and to be considered for funding. *Failure to answer these questions nnd include them with the application will result in the application being considered nonresponsive and not considered for funding.*

1. Do any of the actions included in the proposal require compliance with either the California Environmental Quality Act (CEQA), the National Environmental Policy Act (NEPA), **or** both?

   _____ YES ✓ **NO**

2. **If** you answered yes to # 1, identify the lead governmental agency for CEQA/NEPA compliance.

   _____
   Lead Agency

3. **If** you answered no to # I, explain why CEQA/NEPA compliance is not required for the actions in the proposal.

   The extent of sampling will have no anticipated impact on **the sampled environment.**

4. If CEQA/NEPA compliance **is** required, describe how the project will comply with either or both of these laws. Describe where the project is in the compliance process and the expected date **of** completion.

5. Will the applicant require access across public **or** private property that the applicant does not own to accomplish the activities in the proposal?

   ✓ YES **NO**

   If yes, the applicant must attach written permission **for** access from the relevant property owner(s). Failure to include written permission for access may result in disqualification of the proposal during the review process. Research and monitoring field projects for which specific field locations have not been identified will be required to provide access needs and permission for access with **30** days **of** notification **of** approval.

   All sampling sites will be on State owned public land. Exact locations of sampling are not yet decided. SFEI will provide written permission for access upon approval.

6. **Please indicate what permits or other approvals may be required for the activities contained in your proposal. Check all** boxes that apply.

Conditional use permit	—	
Variance	—	
Subdivision Map Act approval	—	
Grading permit	—	
General plan amendment	—	
Specific plan approval	—	
Rezone	—	
Williamson Act Contract cancellation	—	
Other _____ (please specify)	—	
None required	—	
STATE		
CESA Compliance	—	(CDFG)
Streambed alteration permit	—	(CDFG)
CWA § **401** certification	—	(RWQCB)
Coastal development permit	—	(Coastal Commission/BCDC)
Reclamation Board approval	—	
Notification	—	(DPC, BCDC)
Other _____ (please specify)	—	
None required	—	
FEDERAL		
ESA Consultation	✓	**(USFWS)**
Rivers & Harbors Act permit	—	(ACOE)
CWA § **404** permit	—	(ACOE)
Other _____ (please specify)	—	
None required	—	

DPC = Delta Protection Commission
CWA = Clean Water Act
CESA = California Endangered Species Act
USFWS = U.S. Fish and Wildlife Service
ACOE = U.S. Army Corps of Engineers

ESA = Endangered Species Act
CDFG = California Department of Fish and Game
RWQCB = Regional Water Quality Control Board
BCDC = Bay Conservation and Development Comm.

Land Use Checklist

All applicants must fill out this Land Use Checklist for their proposal. Applications must contain answers to the following questions to be responsive and to be considered for funding. *Failure to answer these questions and include them with the application will result in the application being considered nonresponsive and not considered for funding.*

1. **Do the actions in the proposal involve physical changes to the land(i.e. grading, planting vegetation, or breeching levees) or restrictions in land use (i.e. conservation easement or placement of land in a wildlife refuge)?**

   _____ YES ✓ NO

2. **If NO to # 1, explain what type of actions are involved in the proposal (i.e., research only, planning only).**

   RESEARCH ONLY.

3. If YES to # **1,** what is the proposed land use change or restriction under the proposal?

4. **If** YES to # 1, is the land currently under a Williamson Act contract?

   _____ **YES** _____ ***NO***

5. If YES to # 1, answer the following:

   Current land use _____
   Current zoning _____
   Current general plan designation _____

6. If YES to #1, is the land classified as Prime Farmland, Farmland **of** Statewide Importance **or** Unique Farmland **on the** Department of Conservation Important Farmland Maps?

   _____ YES _____ NO DON'T KNOW

7. **If** YES to # **1,** how many acres **of** land will be subject to physical change **or** land use restrictions under the proposal?

   _____

8. If YES to # **1,** is the property currently being commercially farmed or grazed?

   _____ YES _____ **NO**

9. If YES to #8, what are the number of employees/acre_____
   the total number of employees _____

10. Will the applicant acquire any interest in land under the proposal (fee title or a conservation easement)?

_____ YES ✓ **NO**

11. What entity/organization will hold the interest? N/A

12. If YES to # 10, answer the following:

Total number of acres to be acquired under proposal _____
Number **of** acres to be acquired in fee _____
Number of acres to be subject to conservation easement _____

13. For all proposals involving physical changes to the land **or** restriction in land use, describe what entity or organization will: N/A

manage the property _____

provide operations and maintenance services _____

conduct monitoring _____

14. **For** land acquisitions (fee title or easements), **will** existing water rights also be acquired? N/A

_____ YES _____ NO

15. Does the applicant propose any modifications to the water right **or** change in the delivery of the water?

_____ YES ✓ NO

16. **If** YES to X 15, describe _____